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AUTHOR Kavan, C. Bruce; Gallion, Leona M.
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ABSTRACT

The document describes System 2, a computerized system for analyzing controlled vocabulary material and for comparing the Diamond Jubilee and Century 21 shorthand systems. Background information on three other computer systems for shorthand dictation are briefly described: (1) Reese and Smith Program (University of Tennessee), (2) Kavan and Gallion System (Indiana State University), and (3) Century 21 Computer Analysis (Southwestern Publishing Company). System 2 provides a flexible computerized shorthand system which would contain an unlimited vocabulary base. Four jobstreams were developed for this purpose, each containing a specific function: (1) word base dictionary, (2) update jobstream, (3) dictionary printout jobstream, and (4) shorthand analysis jobstream. The System 2 flowchart is presented and the jobstreams are reproduced from computer printouts. (Author/PC)

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A Computerized System for the Development, Analysis, and Comparison of Diamond Jubilee and Century 21 Shorthand Dictation Materials

by

C. Bruce Kavan
Leona M. Gallion

Indiana State University

U.S. DEPARTMENT OF HEALTH, EDUCATION & WELFARE
NATIONAL INSTITUTE OF EDUCATION

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Historical Perspective

The analysis and verification of shorthand textbook materials by computer has been technically possible for many years. However, a search of the business education literature revealed that only recently have computer systems in shorthand been developed. This development has occurred at two state universities - University of Tennessee and Indiana State University. Furthermore, the computer was also used by SouthWestern Publishing Company in the development of Century 21 shorthand. This section will briefly summarize the known status of these systems.

REESE AND SMITH PROGRAM (University of Tennessee)

An analysis of various sources of shorthand dictation materials by computer was reported by Don Reese and Ray Smith in the January, 1972, issue of the Journal of Business Education.[1] Using excerpts of 200 actual words of material from seven different sources, various factors (i.e., syllabic intensity) were reported for each 200 word passage.

At the 1974 Brigham Young Business Education Invitational Forum, Dr. Ray Smith reported that the data base for their computer program was the first 5000 words on the Perry list with each word coded on the following variables:[2]

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[1] Don Reese and Ray Smith, "A Shorthand Misconception?", Journal of Business Education, (January, 1972, 162-163)

[2] E. Ray Smith, "Learning Efficiency in Shorthand Through Controlled Materials", SHORTHAND--PERSPECTIVE, OPINION, AND DIALOGUE, Research and Service Project No. 2, Alpha Omega Chapter, Delta Pi Epsilon, Brigham Young University, 83-93.

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1. Number of syllables
2. Hundred groupings
3. Typing strokes
4. Shorthand strokes
5. First lesson the word could be written
6. Dale-Chall reading word list
7. Pen rises

No other data on the University of Tennessee system is known to be available nor have copies of the computer output been reviewed.

KAVAN AND GALLION SYSTEM (Indiana State University)

Two computer-based systems in the shorthand area have been designed by the authors of this paper. The first system, implemented in the fall of 1973, was developed for use by students enrolled in shorthand methods classes and workshops where students developed new-matter vocabulary controlled dictation material.

This system was based upon a Word Base Dictionary composed of the 1500 most frequently used words in written business office communications as established by Mellinger.[3] The dictionary for these words contained the following variables:

1. The word image
2. The lesson number in which the word could first be written in beginning shorthand
3. The number of syllables in the word
4. The word frequency groupings in hundreds
5. The word type(s)--brief form, brief form derivatives, word endings, and word beginnings

Details of this system are reported in the March-April, 1975, issue of Creative Computing magazine.[4]

The second computerized shorthand system designated "SYSTEM II" was implemented in April, 1975. The basic design premise of SYSTEM II was to provide the designers with a

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[3]Morris Mellinger, BASIC VACABULARY FOR WRITTEN BUSINESS OFFICE COMMUNICATIONS, Chicago: Chicago State College Publication Series, 1970.

[4]C. Bruce Kavan and Leona M. Gallion, "Shorthand Instruction via Computer", Creative Computing, (March-April, 1975), 38-39.

system that could be used for the verification, analysis, and comparison of Diamond Jubilee and Century 21 shorthand learning materials. In addition, the system was structured to use an unlimited but flexible vocabulary base. This system, SYSTEM II, will be presented in detail in a subsequent section.

CENTURY 21 COMPUTER ANALYSIS (SouthWestern Publishing Company)

The authors and publishers of Century 21 shorthand report that their shorthand system was computer analyzed and controlled throughout its development. In the promotional material for their system[5], they report the computer was used to:

1. process vocabulary, numerical, and phonetic data
2. tabulate frequencies of common word beginnings, word endings, and other word elements
3. measure relative impact of assigning primary and derived shorthand alphabet symbols to specific speech sounds
4. trace the pattern of dominant-direction writing inherent in commonly used general and business vocabularies
5. report (alphabetically and by frequency) words within specified frequency ranges as sources of comstructing controlled practice materials
6. summarize the application of theory principles, Speedforms, high-frequency phrases, and other word categories through consecutive lesson and intermittent-lesson cycles
7. maintain lesson-by-lesson records and periodic summaries of the 1500 most-used words and words within other specified frequency ranges representing vocabulary extension

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[5]"Century 21 Shorthand", Promotional material distributed September, 1974, announcing the Century 21 shorthand system.

8. verify coverage of theory principles, occurrences of Speedforms, consistent use of common phrases, and occurrences of all words in designated frequency ranges.

Details of the computer analysis used by SouthWestern Publishing Company are not available for review. Thus, no specifics can be reported on the design of their computer system.

SYSTEM II DESIGN

The purpose of SYSTEM II was to provide a flexible computerized shorthand system which would contain an unlimited word vocabulary base. To accomplish this purpose, four jobstreams were developed each containing an independent program designed for a specific function. All jobstreams access the Word Base Dictionary or vocabulary base (see exhibit A) which contains the statistical reference ranges from the various shorthand principles to the number of syllables exemplified by a particular word. As such, any word used in the analysis must first be placed onto the Word Base Dictionary. This process is accomplished by the UPDATE jobstream.

The UPDATE jobstream (see exhibit B) is designed to perform all the maintenance functions associated with the Word Base Dictionary. The Dictionary is physically resident on a magnetic disk pack at the computer installation. When any of the SYSTEM II jobstreams are executed, the disk pack is mounted onto the computer so that the statistical information may be accessed randomly by the program from the disk file. The UPDATE jobstream can be used to add, delete, or change words on the Word Base Dictionary disk file. An historical record of the changes made to the Dictionary is generated by the program in the form of an edit prooflist. This prooflist allows for the double checking of the actual word transactions to verify the validity of the statistical information for the particular word. Also, file control totals are generated by the jobstream in order to insure file integrity.

Since this disk pack containing the Word Base Dictionary must be physically handled in the mounting process, the disk is subject to possible damage and loss of information or integrity. In addition, failures due to power outages and hardware or software failures could also cause the Dictionary to be lost. In order to prevent such catastrophies, the BACKUP/RECREATE program is used to periodically backup the disk file to magnetic tape. Thus, if the Dictionary disk file is destroyed, the recreate function of the BACKUP/RECREATE program could be used to restore the Word Base Dictionary disk file and produce the appropriate control totals for file management.

The DICTIONARY PRINTOUT jobstream (see exhibit C) allows for various subsets of the shorthand dictionary to be printed from the disk file. These multiple output options provide a highly flexible information retrieval system from the Word Base Dictionary.

The SHORTHAND ANALYSIS jobstream (see exhibit D) is designed to parametrically control and analyze practice material and output appropriate selective statistical reports.

The flowchart contained in Table 1 contains a visual summary of the inner relationships of these four programs and the Word Base Dictionary.

Conclusions

An issue in the area of shorthand has been whether to use a restricted or a controlled vocabulary. Prior research[6] has established that shorthand learning achievement may be greater when the materials used are vocabulary controlled. However, there is no conclusive evidence as to exactly what controls should be used. Further, data is needed to determine what variables affect the level of difficulty in shorthand dictation materials. SYSTEM II provides a method for the collection and analysis of both Century 21 and Gregg dictation material. Thus, SYSTEM II provides a powerful research tool not only for writing and analyzing controlled vocabulary material but also for providing comparative data on two competing shorthand systems.

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[6] Leona M. Gallion and Alberta Anderson, "Controlled Vocabulary Beginning Shorthand Dictation", Journal of Business Education, October, 1972, pp. 27-28.

Table 1

SYSTEM II FLOWCHART

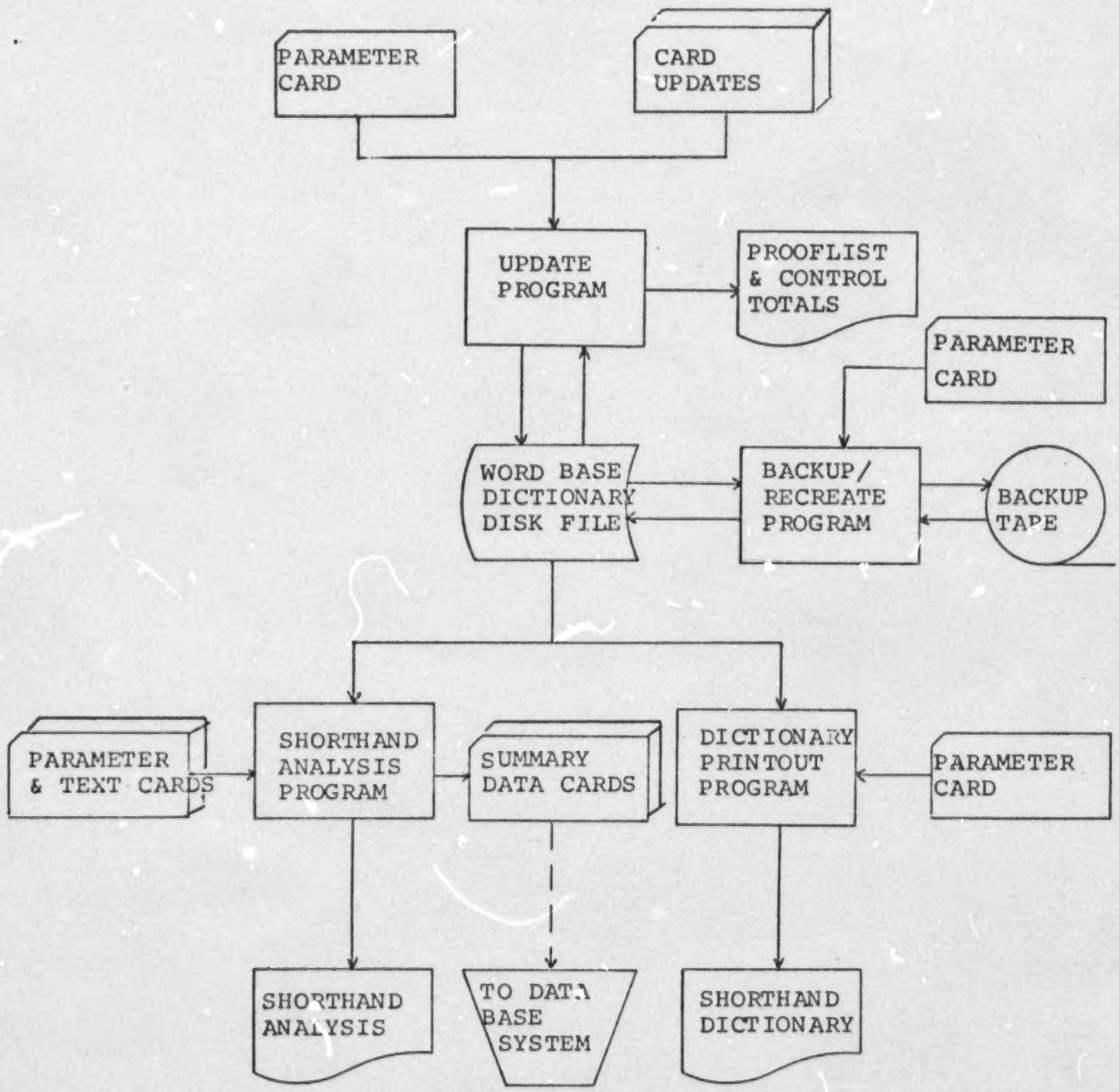

Exhibit A

WORD BASE DICTIONARY

Each entry in the Word Base Dictionary (or vocabulary base) is composed of the following elements:

1. word
2. syllable count
3. Mellinger word list position
4. Perry word list position
5. lesson word could first be written in Gregg DJ shorthand
6. lesson word could first be written in Century 21 shorthand (high school series)
7. lesson word could first be written in Century 21 shorthand (collegiate series)
8. word type for Gregg DJ shorthand
9. word type for Century 21 shorthand
10. principles used in word according to Gregg DJ shorthand
11. principles used in word according to Century 21 shorthand
12. direction of the beginning and ending Gregg DJ stroke
13. direction of the beginning and ending Century 21 stroke
14. number of strokes in word written in Gregg DJ shorthand
15. number of strokes in word written in Century 21 shorthand

SCHOOL OF BUSINESS
SHORTHAND EVALUATION SYSTEM II
INDIANA STATE UNIVERSITY

SHORTHAND DICTIONARY UPDATE
PROOF LIST

DATE 04/12/76

WORD IMAGE	SY CT	MEL POS	PER POS	LES DJ	LES 21H	LES 21C	WF1 DJ	WF2 DJ	WF3 DJ	WF1 21	WF2 21	WF3 21	P1 DJ	P2 DJ	P3 DJ	P1 21	P2 21	P3 21	BS DJ	BS 21	ES DJ	ES 21	NS DJ	NS 21	ACTION/ERROR MESSAGES MAP
KAVAN	16	150	149	50	39	47	9	8	7	6	5	4	98	76	54	98	76	54	15	15	01	01	01	01	SYLL CNT NOT IN RANGE MELL CODE NOT IN RANGE PERRY CD NOT IN RANGE LES CD DJ NOT IN RANGE LCD 21HS NOT IN RANGE LCD 21CL NOT IN RANGE INVALID DJ WORD FORM INVALID 21 WORD FORM
ACE	01	130	125	01	01	01													18	18	01	01	02	02	ADDED TO FILE
AMOUNTS	02	010	018	20	16	10				1			25						18	18	01	01	06	04	DELETED FROM FILE
GALLION	01	130	125	47	34	45													01	01	01	01	01	01	CHANGE FOR NON EXIST

Exhibit B
UPDATE JOBSTREAM

SCHOOL OF BUSINESS
SHORTHAND EVALUATION SYSTEM II
INDIANA STATE UNIVERSITY

SHORTHAND DICTIONARY
COMBINED 100

DATE 04/12/76

WORD IMAGE	SYLLABLE COUNT	MELLINGER-PERRY POSITION		LESSON INTRO DJ	21H	21C	DJ FORM 1	2	3	21 FORM 1	2	3	DJ PRINCIPLE 1	2	3	21 PRINCIPLE 1	2	3	CHARACTER STROKES BDJ	B21	EDJ	E21	NDJ	N21
A	01	00100	00100	03	03	01	1			1									21	21			01	01
ABOUT	02	00100	00100	15	11	09	1			1									18	18	01	01	02	02
ALL	01	00100	00100	07	06	02													18	18	12	12	02	02
ALSO	02	00100	00100	32	14	21	4			4			53			36			02	02	02	02	03	03
AM	01	00100	00100	03	01	10	1			1									13	13			01	01
AN	01	00100	00100	03	03	01	1			1									21	21			01	01
AND	01	00100	00100	11	08	05	1			1									07	07			01	01
ANY	02	00100	00100	05	09	03				1									18	13	18	18	03	02
ARE	01	00100	00100	03	04	01	1			1									12	12			01	01
AS	01	00100	00100	05	01	01				1									18	01	01		02	01
AT	01	00100	00100	03	01	01	1			1									09	09			01	01
BE	01	00100	00100	08	06	09	1			1									01	01			01	01
BEEN	01	00100	00100	05	06	09				1									[illegible]	01	13		[illegible]	
BUSINESS	02	00100	00100	15	12	09	1			1									[illegible]	01	[illegible]	[illegible]	[illegible]	
BUT	01	00100	00100	05	06	09	1												01	01	09	09	02	05
BY	01	00100	00100	08	06	09	1			1									01	01			01	01
CAN	01	00100	00100	05	04	03	1			1									12	03			01	01
COMPANY	03	00100	00100	19	04	10	1			1									12	03	01	01	02	03
COPY	02	00100	00100	07	06	10													12	03	18	18	04	04
DO	01	00100	00100	04	03	03													09	09	08	08	02	02
EACH	01	00100	00100	04	08	10										09			18	18	03	07	02	02
ENCLOSED	02	00100	00100	13	31	06	2			2	3					03			13	13	09	11	03	03
FOR	01	00100	00100	08	06	10	1									02			01	01			01	01
FROM	01	00100	00100	11	04	10	1			1									01	03	13	13	02	02
HAS	01	00100	00100	05	06	11				1									21	18	01	01	03	02
HAVE	01	00100	00100	03	03	02	1			1									01	07			01	01
HE	01	00100	00100	02	01	01				1									21	18	18		02	01
I	01	00100	00100	03	01	01	1												18	20			01	01
IF	01	00100	00100	05	03	03				1									18	03	01		02	01
	01	00100	00100	03	03	03	1			1									13	13			01	01
ICN	04	00100	00100	33	09	10	4	3		1			56	36	04				13	13	03	01	04	02
	01	00100	00100	05	01	01	1			1									01	01			01	01
	01	00100	00100	03	01	01	1			1									09	09			01	01
	01	00100	00100	02	06	03													13	13	02	02	02	02
	02	00100	00100	05	02	02				1									12	12	12	18	04	02
	01	00100	00100	01	03	10													13	13	09	09	03	03
	01	00100	00100	04	04	10													13	13	12	03	03	03
	01	00100	00100	01	01	10													13	13	16	18	02	02
	01	00100	00100	01	01	10													13	13	18	18	02	02
	01	00100	00100	02	01	10				1									13	13	12		03	01

Exhibit C
DICTIONARY JOBSTREAM

SCHOOL OF BUSINESS
SHORTHAND EVALUATION SYSTEM II
INDIANA STATE UNIVERSITY

EXAMPLE

DATE 04/12/76

E D I T E D T E X T I M A G E

DEAR SIR:
****

YOUR LETTER OF MAY FIRST CAME TO ME THIS DAY . IT WILL BE / ONLY THREE
****

DAYS BEFORE I CAN MAIL YOU THE TWO HUNDRED DAILY /01/ PAPERS FOR WHICH YOU
****

ASKED . IS THIS ALL RIGHT WITH YOU ? I WOULD / PUT A FAST SERVICE ON
****

THIS PACKAGE . THE COST WILL BE THREE DOLLARS /02/ FOR THE FIRST ONE
***

HUNDRED , BUT ONLY TWO DOLLARS FOR THE REMAINING / ONE HUNDRED .
******* *** *******

CORDIALLY ,

11

NUMBER OF TEXT CARDS READ---------- 7
NUMBER OF GOOD WORDS ON TEXT CARD---------- 60
NUMBER OF WORDS REJECTED ON TEXT CARDS---------- 8
NUMBER OF GOOD SYLLABLES ON TEXT CARDS---------- 74
NUMBER OF DIFFERENT GOOD WORDS ON TEXT CARDS---------- 43
PERCENT OF DIFFERENT WORDS ON TEXT CARDS---------- 71.666
(DIFFERENT GOOD WORDS / GOOD WORDS)
SYLLABIC INTENSITY(GOOD SYLLABLES/GOOD WORDS)---------- 1.233

PARAMETER CARD INFORMATION:
LESSON CODE DJ---------- 08
LESSON CODE 21HS---------- 35
LESSON CODE 21COL---------- 46
MELLINGER LIST POSITION---------- 01500
PERRY LIST POSITION---------- 12500

Exhibit D
SHORTHAND ANALYSIS
Page 1

SCHOOL OF BUSINESS
SHORTHAND EVALUATION SYSTEM II
INDIANA STATE UNIVERSITY

EXAMPLE

DATE 04/12/76

EDITED TEXT IMAGE

DEAR SIR :
I READ YOUR LETTER OF MAY FIRST THIS DAY . IT WILL / BE ONLY THREE DAYS BEFORE I CAN MAIL YOU THE TWO DAILY /C1/ PAPERS FOR WHICH YOU ASKED . IS THIS ALL RIGHT WITH YOU ? I / WOULD PUT GOOD SERVICE ON THIS PACKAGE . THE COST WILL BE THREE /02/ DOLLARS FOR THE FIRST , BUT ONLY TWO DOLLARS FOR THE / REMAINING .
CORDIALLY ,

NUMBER OF TEXT CARDS READ	7
NUMBER OF GOOD WORDS ON TEXT CARD	61
NUMBER OF WORDS REJECTED ON TEXT CARDS	0
NUMBER OF GOOD SYLLABLES ON TEXT CARDS	75
NUMBER OF DIFFERENT GOOD WORDS ON TEXT CARDS	43
PERCENT OF DIFFERENT WORDS ON TEXT CARDS (DIFFERENT GOOD WORDS / GOOD WORDS)	70.491
SYLLABIC INTENSITY(GOOD SYLLABLES/GOOD WORDS)	1.229

PARAMETER CARD INFORMATION:

LESSON CODE DJ	08
LESSON CODE 21HS	35
LESSON CODE 21COL	46
MELLINGER LIST POSITION	01500
PERRY LIST POSITION	12500

WORD USAGE FREQUENCY

GROUP	FREQUENCY MELLINGER	FREQUENCY PERRY	PERCENT FREQUENCY MELLINGER	PERCENT FREQUENCY PERRY	CUMULATIVE PERCENT FREQUENCY MELLINGER	CUMULATIVE PERCENT FREQUENCY PERRY
00100	41	38	67.21	62.29	67.21	62.29
00200	4	8	6.55	13.11	73.76	75.40
00300	5	2	8.19	3.27	81.95	78.67
00400	1	0	1.63	0.00	83.58	78.67
00500	2	1	3.27	1.63	86.85	80.30
00600	1	2	1.63	3.27	88.48	83.57
00700	1	1	1.63	1.63	90.11	85.20
00800	1	2	1.63	3.27	91.74	88.47
00900	1	0	1.63	0.00	93.37	88.47
01100	0	2	0.00	3.27	93.37	91.74
01200	1	0	1.63	0.00	95.00	91.74
01300	3	0	4.91	0.00	99.91	91.74
01600	0	1	0.00	1.63	99.91	93.37
01900	0	1	0.00	1.63	99.91	95.00
03800	0	1	0.00	1.63	99.91	96.63
05600	0	1	0.00	1.63	99.91	98.26
11400	0	1	0.00	1.63	99.91	99.89
TOTAL	61	61	99.91	99.89		

Exhibit D
SHORTHAND ANALYSIS
page 3

WORD FORM COUNT

TYPE	FREQUENCY DJ	FREQUENCY 21	PERCENT OF WORD FORM BY TOTAL WORD COUNT DJ	PERCENT OF WORD FORM BY TOTAL WORD COUNT 21
BRIEF/SPEED FORM (1)	31	18	50.81	29.50
BRIEF/SPEED FORM DERIVATIVES (2)	1	1	1.63	1.63
WORD ENDINGS (3)	5	5	8.19	8.19
WORD BEGINNING (4)	0	2	0.00	3.27
TOTAL	37	26	60.63	42.59

BEGINNING STROKE DIRECTION

DIRECTION	FREQUENCY DJ	FREQUENCY 21	PERCENT FREQUENCY DJ	PERCENT FREQUENCY 21
DOWNWARD CURVE (01)	15	13	24.59	21.31
DOWNWARD HOOK (02)	4	4	6.55	6.55
DOWNWARD STRAIGHT STROKE (03)	1	4	1.63	6.55
DISJOINED DOWNWARD CURVE (04)	0	0	0.00	0.00
DISJOINED DOWNWARD HOOK (05)	0	0	0.00	0.00
DISJOINED DOWNWARD STRAIGHT STROKE (06)	0	0	0.00	0.00
UPWARD CURVE (07)	6	9	9.83	14.75
UPWARD HOOK (08)	7	4	11.47	6.55
UPWARD STRAIGHT STROKE (09)	10	10	16.39	16.39
DISJOINED UPWARD HOOK (10)	0	0	0.00	0.00
DISJOINED UPWARD STRAIGHT STROKE (11)	0	0	0.00	0.00
FORWARD CURVE (12)	10	6	16.39	9.83
FORWARD STRAIGHT STROKE (13)	2	2	3.27	3.27
FORWARD CURVE WITH UPWARD TURN (14)	0	0	0.00	0.00
DISJOINED STRAIGHT SLANTING STROKE (15)	0	0	0.00	0.00
DISJOINED FORWARD CURVE (16)	0	0	0.00	0.00
DISJOINED FORWARD STRAIGHT STROKE (17)	0	0	0.00	0.00
CIRCLE (18)	6	2	9.83	3.27
DISJOINED CIRCLE (19)	0	0	0.00	0.00
BROKEN CIRCLE (20)	0	3	0.00	4.91
DOT (21)	0	0	0.00	0.00
LOOP (22)	0	0	0.00	0.00
OTHER (23)	0	4	0.00	6.55
TOTAL	61	61	99.95	99.93

Exhibit D
SHORTHAND ANALYSIS
page 5

ENDING STROKE DIRECTION

DIRECTION	FREQUENCY DJ	FREQUENCY 21	PERCENT DJ	PERCENT FREQUENCY 21
DOWNWARD CURVE (01)	6	9	18.75	26.47
DOWNWARD HOOK (02)	0	0	0.00	0.00
DOWNWARD STRAIGHT STROKE (03)	1	1	3.12	2.94
DISJOINED DOWNWARD CURVE (04)	0	0	0.00	0.00
DISJOINED DOWNWARD HOOK (05)	0	0	0.00	0.00
DISJOINED DOWNWARD STRAIGHT STROKE (06)	0	0	0.00	0.00
UPWARD CURVE (07)	1	1	3.12	2.94
UPWARD HOOK (08)	2	2	6.25	5.88
UPWARD STRAIGHT STROKE (09)	7	5	21.87	14.70
DISJOINED UPWARD HOOK (10)	0	0	0.00	0.00
DISJOINED UPWARD STRAIGHT STROKE (11)	0	3	0.00	8.82
FORWARD CURVE (12)	5	5	15.62	14.70
FORWARD STRAIGHT STROKE (13)	1	1	3.12	2.94
FORWARD CURVE WITH UPWARD TURN (14)	0	0	0.00	0.00
DISJOINED STRAIGHT SLANTING STROKE (15)	0	0	0.00	0.00
DISJOINED FORWARD CURVE (16)	0	0	0.00	0.00
DISJOINED FORWARD STRAIGHT STROKE (17)	0	0	0.00	0.00
CIRCLE (18)	8	3	25.00	8.82
DISJOINED CIRCLE (19)	0	0	0.00	0.00
BROKEN CIRCLE (20)	0	0	0.00	0.00
DOT (21)	1	1	3.12	2.94
LOOP (22)	0	3	0.00	8.82
OTHER (23)	0	0	0.00	0.00
TOTAL	32	34	99.97	99.97

NUMBER OF STROKES PER WORD

NUMBER OF STROKES	FREQUENCY DJ	FREQUENCY 21	PERCENT FREQUENCY DJ	PERCENT FREQUENCY 21
07	1	0	1.63	0.00
06	2	1	3.27	1.63
05	5	3	8.19	4.91
04	4	4	6.55	6.55
03	11	14	18.03	22.95
02	9	12	14.75	19.67
01	29	27	47.54	44.26
TOTAL	61	61	99.96	99.97

NUMBER OF SYLLABLES PER WORD

NUMBER OF SYLLABLES	FREQUENCY	PERCENT FREQUENCY
03	2	3.27
02	10	16.39
01	49	80.32
TOTAL	61	99.98

SCHOOL OF BUSINESS
SHORTHAND EVALUATION SYSTEM II
INDIANA STATE UNIVERSITY

EXAMPLE

DATE 04/12/76

LESSON CODE FREQUENCY COUNT

LESSON	FREQUENCY DJ	FREQUENCY 21H	FREQUENCY 21C	PERCENT FREQUENCY DJ	PERCENT FREQUENCY 21H	PERCENT FREQUENCY 21C	CUMULATIVE PERCENT FREQUENCY DJ	CUMULATIVE PERCENT FREQUENCY 21H	CUMULATIVE PERCENT FREQUENCY 21C
25	0	0	1	0.00	0.00	1.63	0.00	0.00	1.63
17	0	1	0	0.00	1.63	0.00	0.00	1.63	1.63
16	0	1	0	0.00	1.63	0.00	0.00	3.26	1.63
14	0	2	2	0.00	3.27	3.27	0.00	6.53	4.90
13	0	0	3	0.00	0.00	4.91	0.00	6.53	9.81
12	0	1	0	0.00	1.63	0.00	0.00	8.16	9.81
11	0	0	3	0.00	0.00	4.91	0.00	8.16	14.72
10	0	0	8	0.00	0.00	13.11	0.00	8.16	27.83
9	0	5	4	0.00	8.19	6.55	0.00	16.35	34.38
8	17	0	0	27.86	0.00	0.00	27.86	16.35	34.38
7	5	3	0	8.19	4.91	0.00	36.05	21.26	34.38
6	0	14	1	0.00	22.95	1.63	36.05	44.21	36.01
5	22	0	0	36.06	0.00	0.00	72.11	44.21	36.01
4	2	9	0	3.27	14.75	0.00	75.38	58.96	36.01
3	8	5	13	13.11	8.19	21.31	88.49	67.15	57.32
2	5	8	13	8.19	13.11	21.31	96.68	80.26	78.63
1	2	12	13	3.27	19.67	21.31	99.95	99.93	99.94
TOTAL	61	61	61	99.95	99.93	99.94			

PRINCIPLE USAGE FREQUENCY TABLE

DJ PRINCIPLE	FREQUENCY	PERCENT FREQUENCY BY TOTAL WORD COUNT
-ING (01)	1	1.63
-LY (03)	4	6.55
EXCEPTIONS TO RE- (93)	1	1.63
TOTAL	6	9.81

21 PRINCIPLE	FREQUENCY	PERCENT FREQUENCY BY TOTAL WORD COUNT
FR (02)	3	4.91
-ED (03)	1	1.63
-ING (06)	1	1.63
BE- (12)	1	1.63
-LY (15)	3	4.91
RE- (26)	1	1.63
CONTRACTED FORMS (74)	1	1.63
TOTAL	11	17.97

MASTER WORD USAGE LIST

WORD IMAGE	FR CT	SY CT	MELLINGER-PERRY POSITION		LESSON DJ	INTRO 21H	INTRO 21C	DJ FORM 1	DJ FORM 2	DJ FORM 3	21 FORM 1	21 FORM 2	21 FORM 3	DJ PRINCIPLE 1	DJ PRINCIPLE 2	DJ PRINCIPLE 3	21 PRINCIPLE 1	21 PRINCIPLE 2	21 PRINCIPLE 3	CHARACTER STROKES BDJ	B21	EDJ	E21	NDJ	N21
ALL	001	01	C0100	CC100	07	06	02													18	18	12	12	02	02
ASKED	001	01	00500	00500	05	07	06				3						03			18	18	09	11	04	04
BE	002	01	00100	00100	08	06	09	1			1									01	01			01	01
BEFORE	001	02	00200	00200	08	09	09	2			4						12			01	01	01	01	02	02
BUT	001	01	00100	00100	05	06	09	1												01	01	09	09	02	03
CAN	001	01	00100	00100	05	04	03	1			1									12	03			01	01
CORDIALLY	001	03	00300	03800	08	16	25	3						03			74			12	03	18	12	07	03
COST	001	01	00200	00200	07	06	03													12	03	09	09	04	04
DAILY	001	02	00900	01100	08	09	13	3			3			03			16			09	09	18	22	05	05
DAY	001	01	00200	00300	01	03	03													09	09	18	18	02	02
DAYS	001	01	00300	00200	03	03	03													09	09	01	01	03	03
DEAR	001	01	00100	05600	02	04	03													09	09	12	12	03	03
DOLLARS	002	02	01300	00600	07	06	03													09	09	01	01	05	05
FIRST	002	01	00100	00200	05	14	14													01	23	09	11	05	03
FOR	003	01	00100	00100	08	06	10	1									02			01	01			01	01
GOOD	001	01	00200	00200	08	07	11	1			1									12	03			01	01
I	003	01	00100	00100	03	01	01	1												18	20			01	01
IS	001	01	00100	00100	05	01	01	1			1									01	01			01	01
IT	001	01	00100	00100	03	01	01	1			1									09	09			01	01
LETTER	001	02	00100	00100	05	02	02				1									12	12	12	18	04	02
MAIL	001	01	00300	00300	02	02	10													13	13	12	12	03	03
MAY	001	01	00100	00100	01	01	10													13	13	18	18	02	02
OF	001	01	00100	00100	03	06	02	1			1									02	02			01	01
ON	001	01	00100	00100	07	06	03													02	02	13	13	02	02
ONLY	002	02	00100	00100	08	09	13	3			3			03			16			02	02	18	22	05	03
	001	02	01200	01600	05	07	11													01	01	03	03	04	04
	001	02	00800	01100	05	03	10													01	01	01	01	05	05
	001	01	00600	00600	08	04	10	1												01	01		09	01	02
	001	01	00700	00700	02	04	03													12	12	09	09	03	03
IG	001	03	01300	01500	02	12	10	3			3	4		93	01		26	06		12	12	21	21	06	06
	001	01	00400	00600	02	04	01													12	12	09	09	03	03
	001	02	00100	00100	05	17	02				2									01	01	01	01	06	06
	001	01	00500	11400	05	04	01													01	01	12	12	03	03
	004	01	00100	00100	05	02	02	1			1									07	07			01	01
	003	01	00100	00100	08	04	03	1												08	07		01	01	02
	002	01	00300	00200	05	06	02													07	23	18		03	01
	002	01	00100	00100	04	01	01													09	09	08	08	02	02
	001	01	00100	00100	08	09	11	1			1									03	07		07	01	02
	002	01	00100	00100	03	02	02	1			1									12	12			01	01
	001	01	00100	00100	05	03	02	1			1									18	07	07		02	01

Exhibit D
page 11
SHORTHAND ANALYSIS

SCHOOL OF BUSINESS
SHORTHAND EVALUATION SYSTEM II
INDIANA STATE UNIVERSITY

EXAMPLE

DATE 04/12/76

MASTER WORD USAGE LIST

WORD IMAGE	FR CT	SY CT	MELLINGER-PERRY POSITION		LESSON INTRO DJ	21H	21C	D. FORM 1	2	3	21 FORM 1	2	3	DJ PRINCIPLE 1	2	3	21 PRINCIPLE 1	2	3	CHARACTER STROKES BDJ	B21	EDJ	E21	NDJ	N21
WCULD	001	01	00100	00100	08	03	03	1			1									09	09			01	01
YOU	003	01	00100	00100	05	01	01	1												08	08			01	01
YOUR	001	01	00100	00100	05	01	01	1			1									08	08			01	01